

UNCLASSIFIED

AD 278 459

*Reproduced
by the*

**ARMED SERVICES TECHNICAL INFORMATION AGENCY
ARLINGTON HALL STATION
ARLINGTON 12, VIRGINIA**



UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

N-62-4c4

RESEARCH REPORT 18

30 APRIL 1962

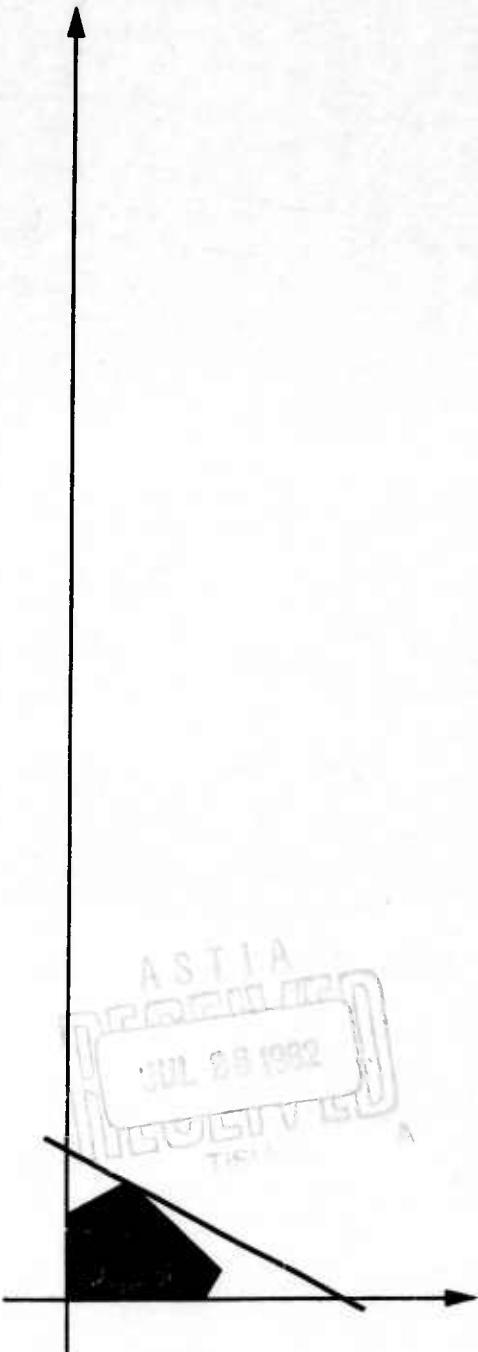
I.E.R. 172-21

278459 CATALOGUED BY ASTIA
AS AD No. _____

OPERATIONS RESEARCH CENTER

INSTITUTE OF ENGINEERING RESEARCH

UNIVERSITY OF CALIFORNIA - BERKELEY



A RELATIONSHIP BETWEEN DENSITY FUNCTIONS

by

Frank A. Haight*
Operations Research Center
University of California, Berkeley

30 April 1962

Research Report 18

This research has been partially supported by the Office of Naval Research under Contract Nonr - 222(83) with the University of California. Reproduction in whole or in part is permitted for any purpose of the United States Government.

*The author is a staff member of the Institute of Transportation and Traffic Engineering at the University of California, Los Angeles.

A RELATIONSHIP BETWEEN DENSITY FUNCTIONS

Section I. General Remarks

Let $f(x)$ be a density function defined over $0 < x < \infty$, having moments

$$m_n = \int_0^\infty x^n f(x) dx$$

and let π_n , $n = 0, 1, 2, \dots$ be a probability distribution. Then

$$g(x) = f(x) \sum_{n=0}^{\infty} \frac{x^n}{m_n} \pi_n$$

is also a density function defined over $0 < x < \infty$. It is easy to see that the n^{th} moment of $g(x)$ is

$$\sum_{i=0}^{\infty} \frac{m_{i+n}}{m_i} \pi_i .$$

By virtue of Taylor's expansion of the function $h(x) = g(x)/f(x)$, we obtain also

$$\frac{\pi_n}{m_n} = \frac{h^{(n)}(0)}{n!} .$$

EXAMPLE 1. If

$$f(x) = \frac{p^q}{\Gamma(q)} e^{-px} x^{q-1}$$

then

$$m_n = p^{-n} \frac{\Gamma(n+q)}{\Gamma(q)} .$$

With Poisson probabilities

$$\pi_n = \frac{e^{-\lambda} \lambda^n}{n!}$$

for the discrete ingredient, we find

$$g(x) = p^q e^{-px} x^{q-1} e^{-\lambda} \frac{I_{q-1}[2(\lambda x p)^{1/2}]}{(\lambda x p)^{1/2(q-1)}}$$

where I_{q-1} is the $(q-1)^{st}$ order modified Bessel function of the First Kind. Bessel function distributions occur in various contexts, the most important of which is the distribution of Mahalanobis "D" statistic. Various references to this and other applications will be found in Reference [3], and a complete theoretical treatment of Bessel function distributions in Reference [6].

EXAMPLE 2. If we retain the Pearson Type III distribution with parameters p and q for $f(x)$, but let the discrete ingredient have a geometric distribution

$$\pi_n = (1 - \lambda) \lambda^n$$

then

$$g(x) = p^q (1 - \lambda) e^{-px(1-\lambda)} x^{q-1} \frac{\gamma(q-1, \lambda x p)}{\Gamma(q-1)}$$

where the numerator denotes the Incomplete Gamma Function in the usual notation. Distributions of this form are also fairly common, especially in the theory of traffic flow, (see Reference [5]).

EXAMPLE 3. Setting $q = 1$ in the last formula, we see that the combination of negative exponential with parameter p and geometric with parameter λ leads to negative exponential with parameter $p(1 - \lambda)$.

Section II. The Distribution of Spread

By far the most important example of the relationship between $f(x)$ and $g(x)$ arises in the special case $\pi_1 = 1$, $\pi_{n \neq 1} = 0$. Then

$$(1) \quad g(x) = \frac{xf(x)}{m}$$

where m is the mean value of $f(x)$.

Oliver and Jewell [7] refer to g as the spread distribution of f , because of the fact that g represents the distribution of length of segment about an arbitrarily chosen point on a line, when the line is divided into contiguous segments with lengths distributed according to the density $f(x)$. This interpretation also occurs in a paper of Breiman, [1] and was apparently also known to Dynkin. [2]

Haight and Mosher [4] refer to $g(x)$ as the time distribution of velocities and to $f(x)$ as the corresponding space distribution of velocities of a collection of vehicles, and show that a road tape in a fixed place will compile $g(x)$ while an aerial photograph will record $f(x)$.

The latter interpretation is of some practical significance, for the road tape is commonly used by traffic engineers to determine speed distributions, while the aerial photograph gives, in theory at least, the "true" distribution

of speeds. Therefore, in passing from quantities computed by means of $g(x)$ to those computed by means of $f(x)$, we are essentially correcting for an experimental bias.

EXAMPLE 4. Apart from the Pearson Type III, the most plausible distribution for speed measurements is the lognormal. Therefore, let

x = speed measured in space

$X = \log x$ (normally distributed with mean μ and variance σ^2)

y = speed measured in time

$Y = \log y$.

By hypothesis, the density for X is

$$C \exp \left[-\frac{(x - \mu)^2}{2\sigma^2} \right], \quad -\infty < x < \infty,$$

where

$$C(2\pi\sigma^2)^{1/2} = 1.$$

Using the transformation $X = \log x$, we find the density function of x to be

$$f(x) = C \frac{1}{x} \exp \left[-\frac{(\log x - \mu)^2}{2\sigma^2} \right], \quad 0 < x < \infty,$$

with mean value

$$m = \exp(\mu + \frac{1}{2}\sigma^2).$$

Using (1), we obtain the distribution of y

$$C \exp \left[-\frac{(\log y - \mu)^2}{2\sigma^2} - m - \frac{1}{2} \sigma^2 \right] , \quad 0 < y < \infty$$

and therefore that of $Y = \log y$ is

$$C \exp \left[-\frac{(Y - \mu - \sigma^2)^2}{2\sigma^2} \right] , \quad -\infty < Y < \infty$$

which is normal with mean $\mu + \sigma^2$ and variance σ^2 . Hence, if data supports the hypothesis of lognormality, the correction for time measurements consists simply in subtracting the variance from the mean to obtain the new mean, after the variables are subjected to the logarithmic transformation.

Section III. Discussion of Tables

In the following tables, we give values based on the assumption of Type III distributions, which will enable the traffic engineer to obtain quickly three different properties of the true velocity distribution from the mean and variance of the observed velocity distribution. If the time mean and variance are M and V , and the space mean and variance are m and v , then it is easy to see that

$$m = \frac{M^2 - v}{M} \quad v = \frac{M^2 v - V^2}{M^2} .$$

Table I, Table II and Table III give values of these formulas for various plausible velocities.

Another quantity of some interest is the proportion of cars going more slowly than a fixed speed, for example the speed limit. If L is the fixed speed, then the proportion can be expressed in the two cases as

$$r = \int_0^L g(x)dx \quad (\text{observed, or time measured proportion})$$

or else

$$R = \int_0^L f(x)dx \quad (\text{true, or space measured proportion}) .$$

Substituting from Equation (1) and integrating by parts, we obtain

$$r = - \frac{p^{q-1}}{(q-1)!} L^{q-1} e^{-pL} + R .$$

Replacing p and q by their values M/V and M^2/V respectively, the value of R can be found by adding to r a correction term which is given in Tables IV ($L = 5$ m.p.h.) - XVII ($L = 70$ m.p.h.).

In Tables XVIII - XX we give, finally, the 85th percentile (in both space and time) as a function of the observed (time measured) mean and variance. The 85th percentile is often used by traffic engineers as the proper speed limit.

I wish to thank Mr. Walter W. Mosher, of the Institute of Transportation and Traffic Engineering, Los Angeles, for his work in programming the formulas for numerical evaluation.

REFERENCES

- [1] Breiman, L., "Optimal Gambling Systems for Favorable Games," Fourth Berkeley Symposium on Probability and Statistics, pp. 65-78.
- [2] Dynkin, E. B., "Limit Theorems for Sums of Independent Random Quantities," Izvestiia Akad. Nauk SSSR, Vol. 19, (1955). pp. 247-266.
- [3] Haight, Frank A., "Index to the Distributions of Mathematical Statistics," J. of Research, National Bureau of Standards, Vol. 65B, no. 1, (Jan.- March 1961). pp. 23-60.
- [4] Haight, Frank A. and Mosher, Walter W., Jr., "A Practical Method for Improving the Accuracy of Vehicular Speed Measurements." Presented at the 41st Annual Meeting of the Highway Research Board, Jan. 8-12, 1962, Washington, D. C.
- [5] Haight, Frank A., Probability Models for Traffic Flow, Academic Press (to appear).
- [6] Laha, R. G., "On Some Properties of the Bessel Function Distributions," Bull. Calcutta Math. Soc., Vol. 46, (1954). pp. 59-72.
- [7] Oliver, Robert M. and Jewell, William, S., "The Distribution of Spread," Operations Research Center, University of California, Berkeley, RR20, 25 Jan. 1962.

TABLE I
 MEAN AND VARIANCE OF SPACE DISTRIBUTED VELOCITIES AS A FUNCTION OF
 MEAN AND VARIANCE OF TIME DISTRIBUTED VELOCITIES
 (ASSUMING TYPE III DISTRIBUTIONS)

X	MEAN	X	5	10	15	20	25	30	35	40	45	50	55	60	65	70
X																
1 X	M= 4.0 N= 9.0	V= 1.0	M= 14.0 N= 30.0	V= 1.0	M= 25.0 N= 45.0	V= 1.0	M= 35.0 N= 55.0	V= 1.0	M= 50.0 N= 60.0	V= 1.0	M= 65.0 N= 70.0	V= 1.0	M= 60.0 N= 70.0	V= 1.0	M= 65.0 N= 70.0	V= 1.0
2 X	M= 4.0 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 2.0	M= 35.0 N= 45.0	V= 2.0	M= 50.0 N= 60.0	V= 2.0	M= 65.0 N= 70.0	V= 2.0	M= 60.0 N= 70.0	V= 2.0	M= 65.0 N= 70.0	V= 2.0
3 X	M= 4.0 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 3.0	M= 34.0 N= 39.0	V= 3.0	M= 44.0 N= 49.0	V= 3.0	M= 55.0 N= 60.0	V= 3.0	M= 65.0 N= 70.0	V= 3.0	M= 60.0 N= 70.0	V= 3.0
4 X	M= 4.0 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 4.0	M= 34.0 N= 39.0	V= 4.0	M= 44.0 N= 49.0	V= 4.0	M= 55.0 N= 60.0	V= 4.0	M= 65.0 N= 70.0	V= 4.0	M= 60.0 N= 70.0	V= 4.0
5 X	M= 4.0 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 5.0	M= 34.0 N= 39.0	V= 5.0	M= 44.0 N= 49.0	V= 5.0	M= 55.0 N= 60.0	V= 5.0	M= 65.0 N= 70.0	V= 5.0	M= 60.0 N= 70.0	V= 5.0
6 X	M= 3.8 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 6.0	M= 34.0 N= 39.0	V= 6.0	M= 44.0 N= 49.0	V= 6.0	M= 55.0 N= 60.0	V= 6.0	M= 65.0 N= 70.0	V= 6.0	M= 60.0 N= 70.0	V= 6.0
7 X	M= 3.6 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 7.0	M= 34.0 N= 39.0	V= 7.0	M= 44.0 N= 49.0	V= 7.0	M= 55.0 N= 60.0	V= 7.0	M= 65.0 N= 70.0	V= 7.0	M= 60.0 N= 70.0	V= 7.0
8 X	M= 3.4 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 8.0	M= 34.0 N= 39.0	V= 8.0	M= 44.0 N= 49.0	V= 8.0	M= 55.0 N= 60.0	V= 8.0	M= 65.0 N= 70.0	V= 8.0	M= 60.0 N= 70.0	V= 8.0
9 X	M= 3.2 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 9.0	M= 34.0 N= 39.0	V= 9.0	M= 44.0 N= 49.0	V= 9.0	M= 55.0 N= 60.0	V= 9.0	M= 65.0 N= 70.0	V= 9.0	M= 60.0 N= 70.0	V= 9.0
10 X	M= 3.0 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 10.0	M= 34.0 N= 39.0	V= 10.0	M= 44.0 N= 49.0	V= 10.0	M= 55.0 N= 60.0	V= 10.0	M= 65.0 N= 70.0	V= 10.0	M= 60.0 N= 70.0	V= 10.0
11 X	M= 2.8 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 11.0	M= 34.0 N= 39.0	V= 11.0	M= 44.0 N= 49.0	V= 11.0	M= 55.0 N= 60.0	V= 11.0	M= 65.0 N= 70.0	V= 11.0	M= 60.0 N= 70.0	V= 11.0
12 X	M= 2.6 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 12.0	M= 34.0 N= 39.0	V= 12.0	M= 44.0 N= 49.0	V= 12.0	M= 55.0 N= 60.0	V= 12.0	M= 65.0 N= 70.0	V= 12.0	M= 60.0 N= 70.0	V= 12.0
13 X	M= 2.4 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 13.0	M= 34.0 N= 39.0	V= 13.0	M= 44.0 N= 49.0	V= 13.0	M= 55.0 N= 60.0	V= 13.0	M= 65.0 N= 70.0	V= 13.0	M= 60.0 N= 70.0	V= 13.0
14 X	M= 2.2 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 14.0	M= 34.0 N= 39.0	V= 14.0	M= 44.0 N= 49.0	V= 14.0	M= 55.0 N= 60.0	V= 14.0	M= 65.0 N= 70.0	V= 14.0	M= 60.0 N= 70.0	V= 14.0
15 X	M= 2.0 N= 9.0	V= 1.0	M= 14.0 N= 19.0	V= 1.0	M= 24.0 N= 29.0	V= 15.0	M= 34.0 N= 39.0	V= 15.0	M= 44.0 N= 49.0	V= 15.0	M= 55.0 N= 60.0	V= 15.0	M= 65.0 N= 70.0	V= 15.0	M= 60.0 N= 70.0	V= 15.0

TABLE 2
MEAN AND VARIANCE OF SPACE DISTRIBUTED VELOCITIES AS A FUNCTION OF
MEAN AND VARIANCE OF TIME DISTRIBUTED VELOCITIES
(ASSUMING TYPE III DISTRIBUTIONS)

TABLE 3
**MEAN AND VARIANCE OF SPACE DISTRIBUTED VELOCITIES AS A FUNCTION OF
 MEAN AND VARIANCE OF TIME DISTRIBUTED VELOCITIES
 (ASSUMING TYPE III DISTRIBUTIONS)**

X	MEAN	5	10	15	20	25	30	35	40	45	50	55	60	65	70
100	X	$\bar{v} = 3.3$ $\sigma^2 = 15.0$ $\mu = 21.0$ $\nu = 26.7$ $N = 32.2$ $M = 42.8$ $m = 48.0$ $M = 53.2$ $m = 58.3$ $M = 63.5$ $m = 68.6$ $V = 55.6$ $v = 75.0$ $V = 84.0$ $v = 91.8$ $V = 93.8$ $v = 95.1$ $V = 96.0$ $v = 97.2$ $V = 97.6$ $v = 98.0$													
110	X	$\bar{v} = 4.7$ $\sigma^2 = 14.5$ $\mu = 20.6$ $\nu = 25.3$ $N = 31.9$ $M = 42.6$ $m = 47.8$ $M = 53.0$ $m = 58.2$ $M = 63.3$ $m = 68.4$ $V = 56.2$ $v = 79.8$ $V = 90.6$ $v = 96.0$ $V = 100.1$ $v = 107.4$ $V = 104.0$ $v = 105.2$ $V = 106.0$ $v = 106.6$ $V = 107.1$ $v = 107.5$													
120	X	$\bar{v} = 7.0$ $\sigma^2 = 14.0$ $\mu = 20.2$ $\nu = 26.0$ $N = 31.6$ $M = 37.0$ $m = 42.3$ $M = 47.6$ $m = 52.8$ $M = 58.0$ $m = 63.2$ $M = 68.3$ $V = 56.0$ $v = 86.0$ $V = 97.0$ $v = 104.0$ $V = 108.3$ $v = 111.0$ $V = 112.9$ $v = 114.2$ $V = 115.2$ $v = 116.0$ $V = 116.6$ $v = 117.1$													
130	X	$\bar{v} = 13.5$ $\sigma^2 = 19.0$ $\mu = 25.7$ $\nu = 31.3$ $N = 36.8$ $M = 42.1$ $m = 47.4$ $M = 52.6$ $m = 57.8$ $M = 63.0$ $m = 68.2$ $V = 37.8$ $v = 103.0$ $V = 111.2$ $v = 116.2$ $V = 119.4$ $v = 121.7$ $V = 123.2$ $v = 124.4$ $V = 125.3$ $v = 126.0$ $V = 126.6$													
140	X	$\bar{v} = 13.0$ $\sigma^2 = 19.4$ $\mu = 25.3$ $\nu = 31.0$ $N = 36.5$ $M = 41.9$ $m = 47.2$ $M = 52.5$ $m = 57.7$ $M = 62.9$ $m = 68.0$ $V = 51.0$ $v = 108.6$ $V = 116.2$ $v = 124.0$ $V = 127.8$ $v = 130.3$ $V = 132.2$ $v = 133.5$ $V = 134.6$ $v = 135.4$ $V = 136.0$													
150	X	$\bar{v} = 12.5$ $\sigma^2 = 19.0$ $\mu = 25.0$ $\nu = 30.7$ $N = 36.3$ $M = 41.7$ $m = 47.0$ $M = 52.3$ $m = 57.5$ $M = 62.7$ $m = 67.9$ $V = 55.0$ $v = 114.0$ $V = 125.0$ $v = 131.0$ $V = 135.0$ $v = 135.9$ $V = 141.0$ $v = 142.6$ $V = 143.8$ $v = 144.7$ $V = 145.4$													
160	X	$\bar{v} = 12.0$ $\sigma^2 = 18.6$ $\mu = 24.7$ $\nu = 30.4$ $N = 36.0$ $M = 41.5$ $m = 46.3$ $M = 52.1$ $m = 57.3$ $M = 62.5$ $m = 67.7$ $V = 56.0$ $v = 119.0$ $V = 131.0$ $v = 131.6$ $V = 139.1$ $v = 144.0$ $V = 147.4$ $v = 149.8$ $V = 151.5$ $v = 152.9$ $V = 154.0$													
170	X	$\bar{v} = 11.5$ $\sigma^2 = 18.2$ $\mu = 24.3$ $\nu = 30.2$ $N = 35.8$ $M = 41.2$ $m = 46.6$ $M = 51.9$ $m = 57.2$ $M = 62.4$ $m = 67.6$ $V = 57.6$ $v = 123.4$ $V = 137.9$ $v = 145.4$ $V = 151.9$ $v = 155.7$ $V = 158.4$ $v = 160.5$ $V = 162.0$ $v = 163.2$ $V = 164.1$													
180	X	$\bar{v} = 11.0$ $\sigma^2 = 17.8$ $\mu = 24.0$ $\nu = 29.9$ $N = 35.5$ $M = 41.0$ $m = 46.4$ $M = 51.7$ $m = 57.0$ $M = 62.2$ $m = 67.4$ $V = 59.0$ $v = 126.2$ $V = 144.0$ $v = 153.6$ $V = 159.8$ $v = 164.0$ $V = 167.0$ $v = 169.3$ $V = 171.0$ $v = 172.3$ $V = 173.4$													
190	X	$\bar{v} = 10.5$ $\sigma^2 = 17.4$ $\mu = 23.7$ $\nu = 29.6$ $N = 35.3$ $M = 40.8$ $m = 46.2$ $M = 51.6$ $m = 56.8$ $M = 62.1$ $m = 67.3$ $V = 59.8$ $v = 132.2$ $V = 149.9$ $v = 160.5$ $V = 167.4$ $v = 172.2$ $V = 175.6$ $v = 178.1$ $V = 180.0$ $v = 181.5$ $V = 182.6$													
200	X	$\bar{v} = 10.0$ $\sigma^2 = 17.0$ $\mu = 23.3$ $\nu = 29.3$ $N = 35.0$ $M = 40.6$ $m = 46.0$ $M = 51.4$ $m = 56.7$ $M = 61.9$ $m = 67.2$ $V = 100.0$ $v = 136.0$ $V = 155.6$ $v = 167.4$ $V = 175.0$ $v = 180.3$ $V = 184.0$ $v = 186.8$ $V = 188.9$ $v = 190.5$ $V = 191.8$													
210	X	$\bar{v} = 16.6$ $\sigma^2 = 23.0$ $\mu = 29.0$ $\nu = 34.0$ $N = 40.3$ $M = 45.8$ $m = 51.2$ $M = 56.5$ $m = 61.8$ $M = 67.0$ $V = 139.4$ $v = 161.0$ $V = 174.0$ $v = 182.4$ $V = 185.2$ $v = 192.4$ $V = 195.4$ $v = 197.8$ $V = 199.6$ $v = 201.0$													
220	X	$\bar{v} = 16.2$ $\sigma^2 = 22.7$ $\mu = 28.7$ $\nu = 34.5$ $N = 40.1$ $M = 45.6$ $m = 51.0$ $M = 56.3$ $m = 61.6$ $M = 66.9$ $V = 142.6$ $v = 166.2$ $V = 180.5$ $v = 189.8$ $V = 196.1$ $v = 200.6$ $V = 204.0$ $v = 206.6$ $V = 208.6$ $v = 210.1$													
230	X	$\bar{v} = 15.8$ $\sigma^2 = 22.3$ $\mu = 28.4$ $\nu = 34.3$ $N = 39.9$ $M = 45.4$ $m = 50.8$ $M = 56.2$ $m = 61.5$ $M = 66.7$ $V = 145.4$ $v = 171.2$ $V = 186.8$ $v = 196.9$ $V = 203.9$ $v = 208.8$ $V = 212.5$ $v = 215.3$ $V = 217.5$ $v = 219.2$													
240	X	$\bar{v} = 15.4$ $\sigma^2 = 22.0$ $\mu = 28.2$ $\nu = 34.0$ $N = 39.7$ $M = 45.2$ $m = 50.6$ $M = 56.0$ $m = 61.3$ $M = 66.6$ $V = 147.6$ $v = 176.0$ $V = 193.0$ $v = 204.0$ $V = 211.0$ $v = 217.0$ $V = 221.0$ $v = 224.0$ $V = 226.4$ $v = 228.3$													

TABLE 4
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 5 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

X	MEAN	VAR	5	10	15	20	25	30	35	40	45	50	55	60	65	70
1 X	P=.080	P=.000														
2 X	P=.113	P=.000														
3 X	P=.138	P=.000														
4 X	P=.160	P=.001	P=.000													
5 X	P=.179	P=.004	P=.000													
6 X	P=.197	P=.008	P=.000													
7 X	P=.213	P=.013	P=.000													
8 X	P=.228	P=.020	P=.000													
9 X	P=.243	P=.028	P=.000													
10 X	P=.258	P=.037	P=.006	P=.000												
11 X	P=.272	P=.046	P=.000													
12 X	P=.286	P=.055	P=.000													
13 X	P=.295	P=.065	P=.000													
14 X	P=.305	P=.075	P=.000													
15 X	P=.308	P=.085	P=.000													
20 X	P=.136	P=.003	P=.000													
25 X	P=.186	P=.008	P=.000													
30 X	P=.232	P=.017	P=.000													
35 X	P=.276	P=.029	P=.000													
40 X	P=.316	P=.045	P=.000													
45 X	P=.359	P=.062	P=.002	P=.000												
50 X	P=.399	P=.081	P=.031	P=.003	P=.000											
55 X	P=.422	P=.102	P=.004	P=.000												
60 X	P=.442	P=.112	P=.009	P=.000												
65 X	P=.446	P=.113	P=.010	P=.000												
70 X	P=.469	P=.018	P=.000													
75 X	P=.492	P=.023	P=.002	P=.001	P=.000											
80 X	P=.515	P=.030	P=.001	P=.001	P=.000											
85 X	P=.539	P=.037	P=.002	P=.001	P=.000											
90 X	P=.563	P=.045	P=.003	P=.003	P=.000											
95 X	P=.581	P=.053	P=.005	P=.000												
100 X	P=.600	P=.063	P=.006	P=.000												
110 X	P=.619	P=.083	P=.008	P=.001	P=.001	P=.000										
120 X	P=.638	P=.106	P=.013	P=.007	P=.007	P=.000										
130 X	P=.650	P=.130	P=.019	P=.009	P=.009	P=.001	P=.000									
140 X	P=.656	P=.156	P=.026	P=.002	P=.000											
150 X	P=.662	P=.162	P=.034	P=.003	P=.000											
160 X	P=.670	P=.170	P=.043	P=.005	P=.005	P=.000										
170 X	P=.679	P=.179	P=.054	P=.007	P=.007	P=.000										
180 X	P=.688	P=.188	P=.065	P=.009	P=.009	P=.001	P=.000									
190 X	P=.698	P=.198	P=.078	P=.012	P=.012	P=.001	P=.000									
200 X	P=.708	P=.209	P=.091	P=.015	P=.015	P=.001	P=.000									
210 X	P=.717	P=.219	P=.105	P=.019	P=.020	P=.002	P=.000									
220 X	P=.726	P=.229	P=.121	P=.024	P=.003	P=.000										
230 X	P=.735	P=.237	P=.137	P=.029	P=.004	P=.000										

TABLE 5
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 10 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

TABLE 6
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 15 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

MEAN	5	10	15	20	25	30	35	40	45	50	55	60	65	70
VARIANCE	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 X	P=.000	P=.027	P=.060	P=.090	P=.120	P=.140	P=.150	P=.160						
2 X	P=.000	P=.033	P=.060	P=.080	P=.100	P=.110								
3 X	P=.000	P=.046	P=.070	P=.090	P=.100	P=.110								
4 X	P=.000	P=.053	P=.075	P=.090	P=.101	P=.110								
5 X	P=.001	P=.059	P=.079	P=.093	P=.103	P=.110								
6 X	P=.002	P=.065	P=.076	P=.085	P=.095	P=.100								
7 X	P=.003	P=.073	P=.083	P=.093	P=.100	P=.103								
8 X	P=.003	P=.075	P=.084	P=.094	P=.101	P=.104								
9 X	P=.003	P=.078	P=.084	P=.094	P=.101	P=.104								
10 X	P=.009	P=.084	P=.094	P=.101	P=.104	P=.107								
11 X	P=.012	P=.087	P=.098	P=.102	P=.106	P=.109								
12 X	P=.015	P=.092	P=.102	P=.106	P=.109	P=.112								
13 X	P=.046	P=.096	P=.103	P=.109	P=.113	P=.117								
14 X	P=.051	P=.100	P=.106	P=.110	P=.114	P=.118								
15 X	P=.052	P=.103	P=.108	P=.113	P=.117	P=.120								
20 X	P=.074	P=.119	P=.125	P=.130	P=.133	P=.137								
25 X	P=.092	P=.133	P=.139	P=.143	P=.146	P=.150	P=.153							
30 X	P=.107	P=.146	P=.153	P=.158	P=.161	P=.164	P=.167							
35 X	P=.122	P=.153	P=.160	P=.165	P=.168	P=.171	P=.174							
40 X	P=.136	P=.169	P=.176	P=.180	P=.183	P=.186	P=.189							
45 X	P=.149	P=.179	P=.185	P=.189	P=.193	P=.197	P=.200							
50 X	P=.162	P=.182	P=.189	P=.193	P=.197	P=.200	P=.203							
55 X	P=.179	P=.190	P=.195	P=.199	P=.203	P=.206	P=.209							
60 X	P=.208	P=.203	P=.206	P=.209	P=.212	P=.215	P=.218							
65 X	P=.217	P=.217	P=.219	P=.221	P=.223	P=.225	P=.227							
70 X	P=.225	P=.220	P=.222	P=.224	P=.226	P=.228	P=.229							
75 X	P=.233	P=.223	P=.225	P=.227	P=.229	P=.231	P=.233							
80 X	P=.242	P=.227	P=.229	P=.231	P=.233	P=.235	P=.237							
85 X	P=.250	P=.230	P=.232	P=.234	P=.236	P=.238	P=.240							
90 X	P=.253	P=.235	P=.235	P=.235	P=.235	P=.235	P=.237							
100 X	P=.274	P=.239	P=.233	P=.227	P=.220	P=.213	P=.207	P=.203	P=.200	P=.197	P=.193	P=.189	P=.185	P=.181
110 X	P=.290	P=.247												
120 X	P=.316	P=.261												
130 X	P=.316	P=.274												
140 X	P=.330	P=.287												
150 X	P=.313	P=.267												
160 X	P=.313	P=.220												
170 X	P=.325	P=.233												
180 X	P=.333	P=.245												
190 X	P=.356	P=.256												
200 X	P=.281	P=.169												
210 X	P=.292	P=.130												
220 X	P=.304	P=.191												
230 X	P=.304	P=.093												

TABLE 7
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 20 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

X	MEAN	5	10	15	20	25	30	35	40	45	50	55	60	65	70
VAR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
2	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
3	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
4	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
5	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
6	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
7	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
8	x	p=.000	p=.000	p=.000	p=.000	p=.000	p=.000								
9	x	p=.001	p=.001	p=.001	p=.001	p=.001	p=.001								
10	x	p=.001	p=.001	p=.001	p=.001	p=.001	p=.001								
11	x	p=.002	p=.002	p=.002	p=.002	p=.002	p=.002								
12	x	p=.002	p=.002	p=.002	p=.002	p=.002	p=.002								
13	x	p=.007	p=.013	p=.023	p=.033	p=.043	p=.053	p=.063	p=.073	p=.083	p=.093	p=.103	p=.113	p=.123	p=.133
14	x	p=.008	p=.016	p=.026	p=.036	p=.046	p=.056	p=.066	p=.076	p=.086	p=.096	p=.106	p=.116	p=.126	p=.136
15	x	p=.013	p=.030	p=.049	p=.059	p=.069	p=.079	p=.089	p=.099	p=.109	p=.119	p=.129	p=.139	p=.149	p=.159
20	x	p=.019	p=.053	p=.089	p=.103	p=.107	p=.111	p=.115	p=.119	p=.123	p=.127	p=.131	p=.135	p=.139	p=.143
25	x	p=.029	p=.066	p=.106	p=.141	p=.145	p=.149	p=.153	p=.157	p=.161	p=.165	p=.169	p=.173	p=.177	p=.181
30	x	p=.040	p=.080	p=.120	p=.159	p=.163	p=.167	p=.171	p=.175	p=.179	p=.183	p=.187	p=.191	p=.195	p=.199
35	x	p=.050	p=.108	p=.168	p=.218	p=.238	p=.258	p=.278	p=.298	p=.318	p=.338	p=.358	p=.378	p=.398	p=.418
40	x	p=.060	p=.139	p=.208	p=.277	p=.327	p=.377	p=.427	p=.477	p=.527	p=.577	p=.627	p=.677	p=.727	p=.777
45	x	p=.070	p=.167	p=.246	p=.325	p=.395	p=.465	p=.535	p=.605	p=.675	p=.745	p=.815	p=.885	p=.955	p=.1025
50	x	p=.079	p=.167	p=.244	p=.322	p=.392	p=.462	p=.532	p=.602	p=.672	p=.742	p=.812	p=.882	p=.952	p=.1022
55	x	p=.131	p=.245	p=.368	p=.491	p=.614	p=.737	p=.850	p=.963	p=.1076	p=.1189	p=.1302	p=.1415	p=.1528	p=.1641
60	x	p=.139	p=.242	p=.365	p=.488	p=.608	p=.728	p=.848	p=.968	p=.1088	p=.1208	p=.1328	p=.1448	p=.1568	p=.1688
65	x	p=.146	p=.241	p=.364	p=.483	p=.603	p=.723	p=.843	p=.963	p=.1083	p=.1203	p=.1323	p=.1443	p=.1563	p=.1683
70	x	p=.153	p=.238	p=.361	p=.481	p=.601	p=.721	p=.841	p=.961	p=.1081	p=.1201	p=.1321	p=.1441	p=.1561	p=.1681
75	x	p=.159	p=.235	p=.359	p=.478	p=.600	p=.718	p=.838	p=.958	p=.1078	p=.1198	p=.1318	p=.1438	p=.1558	p=.1678
80	x	p=.166	p=.232	p=.356	p=.475	p=.595	p=.715	p=.835	p=.955	p=.1075	p=.1195	p=.1315	p=.1435	p=.1555	p=.1675
85	x	p=.173	p=.230	p=.353	p=.472	p=.592	p=.712	p=.832	p=.952	p=.1072	p=.1192	p=.1312	p=.1432	p=.1552	p=.1672
90	x	p=.179	p=.228	p=.350	p=.469	p=.589	p=.710	p=.830	p=.950	p=.1070	p=.1190	p=.1310	p=.1430	p=.1550	p=.1670
100	x	p=.185	p=.221	p=.347	p=.466	p=.586	p=.707	p=.827	p=.947	p=.1067	p=.1187	p=.1307	p=.1427	p=.1547	p=.1667
110	x	p=.198	p=.214	p=.344	p=.463	p=.583	p=.704	p=.824	p=.944	p=.1064	p=.1184	p=.1304	p=.1424	p=.1544	p=.1664
120	x	p=.210	p=.221	p=.341	p=.460	p=.580	p=.701	p=.821	p=.941	p=.1061	p=.1181	p=.1301	p=.1421	p=.1541	p=.1661
130	x	p=.230	p=.229	p=.338	p=.457	p=.577	p=.697	p=.817	p=.937	p=.1057	p=.1177	p=.1297	p=.1417	p=.1537	p=.1657
140	x	p=.240	p=.224	p=.335	p=.454	p=.574	p=.694	p=.814	p=.934	p=.1054	p=.1174	p=.1294	p=.1414	p=.1534	p=.1654
150	x	p=.249	p=.222	p=.332	p=.452	p=.572	p=.692	p=.812	p=.932	p=.1052	p=.1172	p=.1292	p=.1412	p=.1532	p=.1652
160	x	p=.255	p=.220	p=.330	p=.450	p=.570	p=.690	p=.810	p=.930	p=.1050	p=.1170	p=.1290	p=.1410	p=.1530	p=.1650
170	x	p=.267	p=.214	p=.327	p=.447	p=.567	p=.687	p=.807	p=.927	p=.1047	p=.1167	p=.1287	p=.1407	p=.1527	p=.1647
180	x	p=.276	p=.211	p=.324	p=.444	p=.564	p=.684	p=.804	p=.924	p=.1044	p=.1164	p=.1284	p=.1404	p=.1524	p=.1644
190	x	p=.285	p=.209	p=.323	p=.442	p=.562	p=.682	p=.802	p=.922	p=.1042	p=.1162	p=.1282	p=.1402	p=.1522	p=.1642
200	x	p=.294	p=.206	p=.320	p=.439	p=.559	p=.679	p=.800	p=.920	p=.1040	p=.1160	p=.1280	p=.1400	p=.1520	p=.1640
210	x	p=.281	p=.222	p=.317	p=.436	p=.556	p=.676	p=.797	p=.917	p=.1037	p=.1157	p=.1277	p=.1397	p=.1517	p=.1637
220	x	p=.239	p=.230	p=.314	p=.433	p=.553	p=.673	p=.794	p=.914	p=.1034	p=.1154	p=.1274	p=.1394	p=.1514	p=.1634
230	x	p=.239	p=.230	p=.314	p=.433	p=.553	p=.673	p=.794	p=.914	p=.1034	p=.1154	p=.1274	p=.1394	p=.1514	p=.1634

TABLE 8
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 25 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

X	MEAN	VAR	5	10	15	20	25	30	35	40	45	50	55	60	65	70
1	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.016	P=.000								
2	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.023	P=.000								
3	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.028	P=.000								
4	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.032	P=.001	P=.001	P=.000						
5	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.036	P=.002	P=.000							
6	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.039	P=.004	P=.000							
7	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.042	P=.006	P=.000							
8	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.045	P=.008	P=.000							
9	X	P=.000	P=.000	P=.000	P=.000	P=.001	P=.048	P=.010	P=.000							
10	X	P=.000	P=.000	P=.000	P=.002	P=.007	P=.050	P=.012	P=.000							
11	X	P=.000	P=.000	P=.000	P=.002	P=.020	P=.053	P=.015	P=.000							
12	X	P=.000	P=.000	P=.003	P=.003	P=.023	P=.055	P=.017	P=.000							
13	X	P=.001	P=.004	P=.025	P=.025	P=.058	P=.019	P=.000								
14	X	P=.001	P=.005	P=.023	P=.023	P=.060	P=.022	P=.001	P=.000							
15	X	P=.001	P=.006	P=.030	P=.030	P=.062	P=.024	P=.001	P=.000							
20	X	P=.004	P=.012	P=.042	P=.042	P=.071	P=.035	P=.003	P=.000							
25	X	P=.008	P=.020	P=.052	P=.052	P=.080	P=.040	P=.007	P=.000							
30	X	P=.013	P=.027	P=.061	P=.061	P=.087	P=.055	P=.011	P=.000							
35	X	P=.018	P=.035	P=.070	P=.070	P=.094	P=.063	P=.016	P=.001	P=.000						
40	X	P=.024	P=.042	P=.077	P=.077	P=.101	P=.071	P=.021	P=.002	P=.000						
45	X	P=.030	P=.049	P=.084	P=.084	P=.107	P=.078	P=.024	P=.004	P=.000						
50	X	P=.037	P=.056	P=.091	P=.091	P=.113	P=.085	P=.033	P=.005	P=.000						
55	X	P=.063	P=.093	P=.118	P=.118	P=.138	P=.092	P=.038	P=.007	P=.000						
60	X	P=.069	P=.104	P=.124	P=.124	P=.144	P=.098	P=.044	P=.010	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
65	X	P=.076	P=.109	P=.129	P=.129	P=.149	P=.094	P=.049	P=.012	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
70	X	P=.082	P=.115	P=.134	P=.134	P=.159	P=.095	P=.055	P=.015	P=.002	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
75	X	P=.088	P=.120	P=.138	P=.138	P=.155	P=.096	P=.053	P=.018	P=.003	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
80	X	P=.094	P=.125	P=.143	P=.143	P=.160	P=.096	P=.066	P=.021	P=.004	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
85	X	P=.099	P=.130	P=.147	P=.147	P=.165	P=.102	P=.071	P=.025	P=.005	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000
90	X	P=.105	P=.135	P=.152	P=.152	P=.176	P=.076	P=.028	P=.006	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
100	X	P=.116	P=.144	P=.160	P=.160	P=.179	P=.086	P=.035	P=.009	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
110	X	P=.126	P=.153	P=.168	P=.168	P=.187	P=.095	P=.042	P=.012	P=.002	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
120	X	P=.137	P=.162	P=.175	P=.175	P=.196	P=.104	P=.094	P=.016	P=.003	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
130	X	P=.170	P=.183	P=.193	P=.193	P=.213	P=.164	P=.113	P=.057	P=.004	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000
140	X	P=.173	P=.190	P=.190	P=.190	P=.211	P=.121	P=.064	P=.024	P=.006	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000
150	X	P=.185	P=.197	P=.197	P=.197	P=.218	P=.178	P=.071	P=.028	P=.008	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000
160	X	P=.193	P=.203	P=.203	P=.203	P=.213	P=.185	P=.087	P=.033	P=.010	P=.002	P=.000	P=.000	P=.000	P=.000	P=.000
170	X	P=.203	P=.216	P=.216	P=.216	P=.225	P=.192	P=.145	P=.085	P=.038	P=.012	P=.003	P=.000	P=.000	P=.000	P=.000
180	X	P=.215	P=.222	P=.222	P=.222	P=.230	P=.199	P=.152	P=.092	P=.043	P=.015	P=.004	P=.001	P=.000	P=.000	P=.000
190	X	P=.223	P=.229	P=.229	P=.229	P=.234	P=.211	P=.166	P=.106	P=.053	P=.020	P=.006	P=.001	P=.000	P=.000	P=.000
200	X	P=.234	P=.218	P=.218	P=.218	P=.172	P=.172	P=.112	P=.058	P=.023	P=.007	P=.002	P=.000	P=.000	P=.000	P=.000
210	X	P=.240	P=.223	P=.223	P=.223	P=.179	P=.179	P=.119	P=.063	P=.026	P=.008	P=.002	P=.000	P=.000	P=.000	P=.000
220	X	P=.246	P=.229	P=.229	P=.229	P=.185	P=.185	P=.125	P=.069	P=.030	P=.010	P=.003	P=.000	P=.000	P=.000	P=.000
230	X															

TABLE 9
 CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
 THIS TABLE IS FOR A SPEED OF 30 MPH
 (ASSUMING TYPE III DISTRIBUTIONS)

X	MEAN	5	10	15	20	25	30	35	40	45	50	55	60	65	70
VAR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.013	P=.000						
2	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.023	P=.000						
3	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.002	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
4	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.027	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
5	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.030	P=.002	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
6	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.005	P=.003	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
7	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.007	P=.005	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
8	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.009	P=.007	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
9	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.012	P=.009	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
10	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.014	P=.011	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
11	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.016	P=.013	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000
12	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.002	P=.018	P=.015	P=.000	P=.000	P=.000	P=.000	P=.000
13	X	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000	P=.003	P=.020	P=.018	P=.017	P=.000	P=.000	P=.000	P=.000
14	X	P=.000	P=.000	P=.000	P=.000	P=.003	P=.000	P=.023	P=.019	P=.019	P=.011	P=.000	P=.000	P=.000	P=.000
15	X	P=.000	P=.001	P=.000	P=.004	P=.002	P=.005	P=.025	P=.020	P=.020	P=.011	P=.000	P=.000	P=.000	P=.000
20	X	P=.001	P=.002	P=.009	P=.034	P=.016	P=.044	P=.059	P=.030	P=.023	P=.013	P=.000	P=.000	P=.000	P=.000
25	X	P=.002	P=.004	P=.015	P=.043	P=.022	P=.046	P=.066	P=.038	P=.028	P=.015	P=.000	P=.000	P=.000	P=.000
30	X	P=.004	P=.007	P=.021	P=.050	P=.031	P=.050	P=.073	P=.046	P=.038	P=.017	P=.000	P=.000	P=.000	P=.000
35	X	P=.006	P=.011	P=.027	P=.057	P=.039	P=.057	P=.079	P=.053	P=.053	P=.014	P=.001	P=.000	P=.000	P=.000
40	X	P=.009	P=.015	P=.033	P=.064	P=.042	P=.052	P=.075	P=.060	P=.056	P=.019	P=.001	P=.000	P=.000	P=.000
45	X	P=.012	P=.024	P=.044	P=.075	P=.052	P=.075	P=.094	P=.071	P=.066	P=.023	P=.003	P=.000	P=.000	P=.000
50	X	P=.016	P=.028	P=.050	P=.081	P=.050	P=.077	P=.094	P=.077	P=.077	P=.033	P=.015	P=.005	P=.000	P=.000
55	X	P=.023	P=.033	P=.055	P=.086	P=.055	P=.086	P=.103	P=.082	P=.082	P=.038	P=.019	P=.007	P=.001	P=.000
60	X	P=.037	P=.060	P=.091	P=.109	P=.074	P=.107	P=.107	P=.087	P=.087	P=.065	P=.014	P=.001	P=.000	P=.000
65	X	P=.042	P=.065	P=.095	P=.119	P=.075	P=.111	P=.111	P=.091	P=.091	P=.066	P=.011	P=.002	P=.000	P=.000
70	X	P=.047	P=.070	P=.100	P=.127	P=.070	P=.115	P=.115	P=.094	P=.094	P=.071	P=.016	P=.007	P=.000	P=.000
75	X	P=.051	P=.074	P=.104	P=.140	P=.074	P=.119	P=.119	P=.091	P=.091	P=.077	P=.019	P=.004	P=.000	P=.000
80	X	P=.055	P=.079	P=.108	P=.146	P=.079	P=.123	P=.123	P=.104	P=.104	P=.060	P=.022	P=.005	P=.000	P=.000
85	X	P=.060	P=.083	P=.112	P=.146	P=.112	P=.126	P=.126	P=.108	P=.108	P=.065	P=.025	P=.005	P=.000	P=.000
90	X	P=.069	P=.092	P=.119	P=.152	P=.119	P=.133	P=.133	P=.107	P=.107	P=.073	P=.031	P=.014	P=.002	P=.000
100	X	P=.077	P=.100	P=.133	P=.174	P=.127	P=.140	P=.140	P=.115	P=.115	P=.091	P=.037	P=.011	P=.002	P=.000
110	X	P=.086	P=.107	P=.133	P=.164	P=.133	P=.146	P=.146	P=.116	P=.116	P=.098	P=.043	P=.014	P=.003	P=.000
120	X	P=.115	P=.140	P=.152	P=.184	P=.140	P=.152	P=.152	P=.136	P=.136	P=.095	P=.049	P=.018	P=.004	P=.000
130	X	P=.122	P=.146	P=.162	P=.194	P=.146	P=.162	P=.162	P=.143	P=.143	P=.102	P=.055	P=.022	P=.006	P=.000
140	X	P=.129	P=.152	P=.174	P=.204	P=.152	P=.174	P=.174	P=.143	P=.143	P=.108	P=.065	P=.025	P=.005	P=.000
150	X	P=.136	P=.160	P=.189	P=.219	P=.160	P=.189	P=.189	P=.149	P=.149	P=.109	P=.062	P=.026	P=.008	P=.000
160	X	P=.142	P=.164	P=.194	P=.228	P=.164	P=.194	P=.194	P=.158	P=.158	P=.116	P=.068	P=.030	P=.010	P=.000
170	X	P=.149	P=.177	P=.200	P=.238	P=.177	P=.200	P=.200	P=.174	P=.174	P=.130	P=.073	P=.034	P=.012	P=.000
180	X	P=.155	P=.175	P=.184	P=.214	P=.175	P=.184	P=.184	P=.155	P=.155	P=.116	P=.079	P=.038	P=.014	P=.000
190	X	P=.162	P=.180	P=.189	P=.219	P=.180	P=.189	P=.189	P=.155	P=.155	P=.112	P=.085	P=.043	P=.016	P=.000
200	X	P=.168	P=.185	P=.194	P=.224	P=.185	P=.194	P=.194	P=.160	P=.160	P=.116	P=.091	P=.047	P=.019	P=.000
210	X	P=.174	P=.191	P=.199	P=.228	P=.191	P=.199	P=.199	P=.165	P=.165	P=.116	P=.096	P=.052	P=.022	P=.000
220	X	P=.175	P=.192	P=.200	P=.232	P=.192	P=.200	P=.200	P=.171	P=.171	P=.120	P=.096	P=.056	P=.025	P=.000
230	X	P=.176	P=.196	P=.203	P=.238	P=.196	P=.203	P=.203	P=.175	P=.175	P=.121	P=.097	P=.057	P=.027	P=.000

TABLE 10
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 35 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

X	MEAN	X	5	10	15	20	25	30	35	40	45	50	55	60	65	70	
	VAR	X															
1 X	P=.000	P=.011	P=.000														
2 X	P=.000	P=.016	P=.000														
3 X	P=.000	P=.020	P=.000														
4 X	P=.000	P=.023	P=.001	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000								
5 X	P=.000	P=.025	P=.002	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000								
6 X	P=.000	P=.028	P=.003	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000								
7 X	P=.000	P=.030	P=.004	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000								
8 X	P=.000	P=.008	P=.032	P=.006	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000							
9 X	P=.000	P=.010	P=.034	P=.008	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000							
10 X	P=.000	P=.012	P=.036	P=.009	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000							
11 X	P=.000	P=.014	P=.038	P=.011	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000							
12 X	P=.000	P=.015	P=.039	P=.013	P=.000	P=.000	P=.000	P=.000	P=.000	P=.000							
13 X										P=.017	P=.014	P=.000	P=.000	P=.000	P=.000	P=.000	
14 X										P=.019	P=.043	P=.016	P=.001	P=.000	P=.000	P=.000	
15 X										P=.021	P=.044	P=.018	P=.001	P=.000	P=.000	P=.000	
20 X										P=.021	P=.051	P=.026	P=.003	P=.000	P=.000	P=.000	
25 X										P=.022	P=.057	P=.033	P=.005	P=.000	P=.000	P=.000	
30 X										P=.025	P=.062	P=.043	P=.014	P=.009	P=.001	P=.000	
35 X										P=.027	P=.067	P=.046	P=.013	P=.001	P=.000	P=.000	
40 X										P=.029	P=.054	P=.021	P=.017	P=.002	P=.000	P=.000	
45 X										P=.032	P=.060	P=.016	P=.016	P=.003	P=.000	P=.000	
50 X										P=.036	P=.051	P=.029	P=.017	P=.005	P=.000	P=.000	
55 X										P=.036	P=.057	P=.033	P=.022	P=.006	P=.000	P=.000	
60 X										P=.043	P=.062	P=.043	P=.030	P=.009	P=.001	P=.000	
65 X										P=.043	P=.067	P=.049	P=.037	P=.013	P=.001	P=.000	
70 X										P=.054	P=.072	P=.051	P=.037	P=.017	P=.002	P=.000	
75 X										P=.052	P=.076	P=.056	P=.041	P=.021	P=.003	P=.000	
80 X										P=.056	P=.081	P=.061	P=.045	P=.025	P=.005	P=.000	
85 X										P=.064	P=.085	P=.085	P=.066	P=.049	P=.017	P=.004	
90 X										P=.064	P=.092	P=.092	P=.075	P=.053	P=.020	P=.005	
100 X										P=.066	P=.097	P=.097	P=.080	P=.063	P=.022	P=.006	
110 X										P=.074	P=.102	P=.114	P=.099	P=.078	P=.028	P=.009	
120 X										P=.080	P=.108	P=.120	P=.106	P=.083	P=.053	P=.023	
130 X										P=.084	P=.114	P=.125	P=.111	P=.076	P=.038	P=.003	
140 X										P=.089	P=.119	P=.130	P=.117	P=.083	P=.044	P=.004	
150 X										P=.096	P=.102	P=.125	P=.135	P=.122	P=.089	P=.049	
160 X										P=.108	P=.110	P=.140	P=.128	P=.094	P=.054	P=.024	
170 X										P=.114	P=.113	P=.144	P=.133	P=.100	P=.059	P=.027	
180 X										P=.119	P=.114	P=.152	P=.141	P=.105	P=.065	P=.031	
190 X										P=.124	P=.144	P=.153	P=.150	P=.070	P=.038	P=.013	
200 X										P=.129	P=.149	P=.157	P=.146	P=.115	P=.075	P=.039	
210 X										P=.134	P=.153	P=.162	P=.151	P=.120	P=.079	P=.042	
220 X										P=.139	P=.157	P=.166	P=.155	P=.125	P=.084	P=.046	
230 X										P=.143	P=.162	P=.170	P=.159	P=.129	P=.089	P=.050	
										P=.148	P=.166	P=.173	P=.163	P=.134	P=.093	P=.054	P=.025

TABLE 11
 CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
 THIS TABLE IS FOR A SPEED OF 40 MPH
 (ASSUMING TYPE III DISTRIBUTIONS)

TABLE 12
 CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
 THIS TABLE IS FOR A SPEED OF 45 MPH
 (ASSUMING TYPE III DISTRIBUTIONS)

TABLE 13
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 50 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

TABLE 14
 CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
 THIS TABLE IS FOR A SPEED OF 55 MPH
 (ASSUMING TYPE III DISTRIBUTIONS)

TABLE 15
CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
THIS TABLE IS FOR A SPEED OF 60 MPH
(ASSUMING TYPE III DISTRIBUTIONS)

TABLE 16
 CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
 THIS TABLE IS FOR A SPEED OF 65 MPH
 (ASSUMING TYPE III DISTRIBUTIONS)

TABLE 17
 CORRECTION FACTORS AS A FUNCTION OF MEAN AND VARIANCE
 THIS TABLE IS FOR A SPEED OF 70 MPH
 (ASSUMING TYPE III DISTRIBUTIONS)

X		Y		Z		W		V		U		T		S		R		Q		P		N		M		L		K		J		I		H		G		F		E		D		C		B		A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
X		Y		Z		W		V		U		T		S		R		Q		P		N		M		L		K		J		I		H		G		F		E		D		C		B		A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
1	X	2	X	3	X	4	X	5	X	6	X	7	X	8	X	9	X	10	X	11	X	12	X	13	X	14	X	15	X	16	X	17	X	18	X	19	X	20	X	21	X	22	X	23	X	24	X	25	X	26	X	27	X	28	X	29	X	30	X	31	X	32	X	33	X	34	X	35	X	36	X	37	X	38	X	39	X	40	X	41	X	42	X	43	X	44	X	45	X	46	X	47	X	48	X	49	X	50	X	51	X	52	X	53	X	54	X	55	X	56	X	57	X	58	X	59	X	60	X	61	X	62	X	63	X	64	X	65	X	66	X	67	X	68	X	69	X	70	X	71	X	72	X	73	X	74	X	75	X	76	X	77	X	78	X	79	X	80	X	81	X	82	X	83	X	84	X	85	X	86	X	87	X	88	X	89	X	90	X	91	X	92	X	93	X	94	X	95	X	96	X	97	X	98	X	99	X	100	X	101	X	102	X	103	X	104	X	105	X	106	X	107	X	108	X	109	X	110	X	111	X	112	X	113	X	114	X	115	X	116	X	117	X	118	X	119	X	120	X	121	X	122	X	123	X	124	X	125	X	126	X	127	X	128	X	129	X	130	X	131	X	132	X	133	X	134	X	135	X	136	X	137	X	138	X	139	X	140	X	141	X	142	X	143	X	144	X	145	X	146	X	147	X	148	X	149	X	150	X	151	X	152	X	153	X	154	X	155	X	156	X	157	X	158	X	159	X	160	X	161	X	162	X	163	X	164	X	165	X	166	X	167	X	168	X	169	X	170	X	171	X	172	X	173	X	174	X	175	X	176	X	177	X	178	X	179	X	180	X	181	X	182	X	183	X	184	X	185	X	186	X	187	X	188	X	189	X	190	X	191	X	192	X	193	X	194	X	195	X	196	X	197	X	198	X	199	X	200	X	201	X	202	X	203	X	204	X	205	X	206	X	207	X	208	X	209	X	210	X	211	X	212	X	213	X	214	X	215	X	216	X	217	X	218	X	219	X	220	X	221	X	222	X	223	X	224	X	225	X	226	X	227	X	228	X	229	X	230	X	231	X	232	X	233	X	234	X	235	X	236	X	237	X	238	X	239	X	240	X	241	X	242	X	243	X	244	X	245	X	246	X	247	X	248	X	249	X	250	X	251	X	252	X	253	X	254	X	255	X	256	X	257	X	258	X	259	X	260	X	261	X	262	X	263	X	264	X	265	X	266	X	267	X	268	X	269	X	270	X	271	X	272	X	273	X	274	X	275	X	276	X	277	X	278	X	279	X	280	X	281	X	282	X	283	X	284	X	285	X	286	X	287	X	288	X	289	X	290	X	291	X	292	X	293	X	294	X	295	X	296	X	297	X	298	X	299	X	300	X	301	X	302	X	303	X	304	X	305	X	306	X	307	X	308	X	309	X	310	X	311	X	312	X	313	X	314	X	315	X	316	X	317	X	318	X	319	X	320	X	321	X	322	X	323	X	324	X	325	X	326	X	327	X	328	X	329	X	330	X	331	X	332	X	333	X	334	X	335	X	336	X	337	X	338	X	339	X	340	X	341	X	342	X	343	X	344	X	345	X	346	X	347	X	348	X	349	X	350	X	351	X	352	X	353	X	354	X	355	X	356	X	357	X	358	X	359	X	360	X	361	X	362	X	363	X	364	X	365	X	366	X	367	X	368	X	369	X	370	X	371	X	372	X	373	X	374	X	375	X	376	X	377	X	378	X	379	X	380	X	381	X	382	X	383	X	384	X	385	X	386	X	387	X	388	X	389	X	390	X	391	X	392	X	393	X	394	X	395	X	396	X	397	X	398	X	399	X	400	X	401	X	402	X	403	X	404	X	405	X	406	X	407	X	408	X	409	X	410	X	411	X	412	X	413	X	414	X	415	X	416	X	417	X	418	X	419	X	420	X	421	X	422	X	423	X	424	X	425	X	426	X	427	X	428	X	429	X	430	X	431	X	432	X	433	X	434	X	435	X	436	X	437	X	438	X	439	X	440	X	441	X	442	X	443	X	444	X	445	X	446	X	447	X	448	X	449	X	450	X	451	X	452	X	453	X	454	X	455	X	456	X	457	X	458	X	459	X	460	X	461	X	462	X	463	X	464	X	465	X	466	X	467	X	468	X	469	X	470	X	471	X	472	X	473	X	474	X	475	X	476	X	477	X	478	X	479	X	480	X	481	X	482	X	483	X	484	X	485	X	486	X	487	X	488	X	489	X	490	X	491	X	492	X	493	X	494	X	495	X	496	X	497	X	498	X	499	X	500	X	501	X	502	X	503	X	504	X	505	X	506	X	507	X	508	X	509	X	510	X	511	X	512	X	513	X	514	X	515	X	516	X	517	X	518	X	519	X	520	X	521	X	522	X	523	X	524	X	525	X	526	X	527	X	528	X	529	X	530	X	531	X	532	X	533	X	534	X	535	X	536	X	537	X	538	X	539	X	540	X	541	X	542	X	543	X	544	X	545	X	546	X	547	X	548	X	549	X	550	X	551	X	552	X	553	X	554	X	555	X	556	X	557	X	558	X	559	X	560	X	561	X	562	X	563	X	564	X	565	X	566	X	567	X	568	X	569	X	570	X	571	X	572	X	573	X	574	X	575	X	576	X	577	X	578	X	579	X	580	X	581	X	582	X	583	X	584	X	585	X	586	X	587	X	588	X	589	X	590	X	591	X	592	X	593	X	594	X	595	X	596	X	597	X	598	X	599	X	600	X	601	X	602	X	603	X	604	X	605	X	606	X	607	X	608	X	609	X	610	X	611	X	612	X	613	X	614	X	615	X	616	X	617	X	618	X	619	X	620	X	621	X	622	X	623	X	624	X	625	X	626	X	627	X	628	X	629	X	630	X	631	X	632	X	633	X	634	X	635	X	636	X	637	X	638	X	639	X	640	X	641	X	642	X	643	X	644	X	645	X	646	X	647	X	648	X	649	X	650	X	651	X	652	X	653	X	654	X	655	X	656	X	657	X	658	X	659	X	660	X	661	X	662	X	663	X	664	X	665	X	666	X	667	X	668	X	669	X	670	X	671	X	672	X	673	X	674	X	675	X	676	X	677	X	678	X	679	X	680	X	681	X	682	X	683	X	684	X	685	X	686	X	687	X	688	X	689	X	690	X	691	X	692	X	693	X	694	X	695	X	696	X	697	X	698	X	699	X	700	X	701	X	702	X	703	X	704	X	705	X	706	X	707	X	708	X	709	X	710	X	711	X	712	X	713	X	714	X	715	X	716	X	717	X	718	X	719	X	720	X	721	X	722	X	723	X	724	X	725	X	726	X	727	X	728	X	729	X	730	X	731	X	732	X	733	X	734	X	735	X	736	X	737	X	738	X	739	X	740	X	741	X	742	X	743	X	744	X	745	X	746	X	747	X	748	X	749	X	750	X	751	X	752	X	753	X	754	X	755	X	756	X	757	X	758	X	759	X	760	X	761	X	762	X	763	X	764	X	765	X	766	X	767	X	768	X	769	X	770	X	771	X	772	X	773	X	774	X	775	X	776	X	777	X	778	X	779	X	780	X	781	X	782	X	783	X	784	X	785	X	786	X	787	X	788	X	789	X	790	X	791	X	792	X	793	X	794	X	795	X	796	X	797	X	798	X	799	X	800	X	801	X	802	X	803	X	804	X	805	X	806	X	807	X	808	X	809	X	810	X	811	X	812	X	813	X	814	X	815	X	816	X	817	X	818	X	819	X	820	X	821	X	822	X	823	X	824	X	825	X	826	X	827	X	828	X	829	X	830	X	831	X	832	X	833</td

TABLE 18
**85TH PERCENTILE SPACE DISTRIBUTED (S) AND TIME DISTRIBUTED (T) VELOCITIES
 AS A FUNCTION OF MEAN AND VARIANCE OF TIME DISTRIBUTED VELOCITIES
 (ASSUMING TYPE III DISTRIBUTIONS)**

X MEAN		2	10	15	20	25	30	35	40	45	50	55	60	65	70
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VAR															
1	X	S 5.8	S 10.9	S 16.0	S 21.0	S 26.0	S 31.0	S 36.0	S 41.0	S 46.0	S 51.0	S 56.0	S 61.0	S 66.0	S 71.0
	X	T 6.0	T 11.0	T 16.0	T 21.0	T 26.0	T 31.0	T 36.0	T 41.0	T 46.0	T 51.0	T 56.0	T 61.0	T 66.0	T 71.0
2	X	S 6.0	S 11.3	S 16.3	S 21.4	S 26.4	S 31.4	S 36.4	S 41.4	S 46.4	S 51.4	S 56.4	S 61.4	S 66.4	S 71.4
	X	T 6.5	T 11.5	T 16.5	T 21.5	T 26.5	T 31.5	T 36.5	T 41.5	T 46.5	T 51.5	T 56.5	T 61.5	T 66.5	T 71.5
3	X	S 6.1	S 11.5	S 16.6	S 21.6	S 26.7	S 31.7	S 36.7	S 41.7	S 46.7	S 51.7	S 56.7	S 61.8	S 66.8	S 71.8
	X	T 6.8	T 11.8	T 16.8	T 21.8	T 26.8	T 31.8	T 36.8	T 41.8	T 46.8	T 51.8	T 56.8	T 61.8	T 66.8	T 71.8
4	X	S 6.1	S 11.6	S 16.8	S 21.9	S 26.9	S 31.9	S 37.0	S 42.0	S 47.0	S 52.0	S 57.0	S 62.0	S 67.0	S 72.0
	X	T 7.0	T 12.1	T 17.1	T 22.1	T 27.1	T 32.1	T 37.1	T 42.1	T 47.1	T 52.1	T 57.1	T 62.1	T 67.1	T 72.1
5	X	S 6.0	S 11.8	S 17.0	S 22.1	S 27.1	S 32.1	S 37.2	S 42.2	S 47.2	S 52.2	S 57.2	S 62.2	S 67.2	S 72.2
	X	T 7.3	T 12.3	T 17.3	T 22.3	T 27.3	T 32.3	T 37.3	T 42.3	T 47.3	T 52.3	T 57.3	T 62.3	T 67.3	T 72.3
6	X	S 5.9	S 11.9	S 17.1	S 22.2	S 27.3	S 32.3	S 37.4	S 42.4	S 47.4	S 52.4	S 57.4	S 62.4	S 67.5	S 72.5
	X	T 7.5	T 12.5	T 17.5	T 22.5	T 27.5	T 32.5	T 37.5	T 42.5	T 47.5	T 52.5	T 57.5	T 62.5	T 67.5	T 72.5
7	X	S 5.8	S 11.9	S 17.2	S 22.4	S 27.4	S 32.5	S 37.5	S 42.6	S 47.6	S 52.6	S 57.6	S 62.6	S 67.6	S 72.6
	X	T 7.7	T 12.7	T 17.7	T 22.7	T 27.7	T 32.7	T 37.7	T 42.7	T 47.7	T 52.7	T 57.7	T 62.7	T 67.7	T 72.8
8	X	S 5.7	S 12.0	S 17.3	S 22.5	S 27.6	S 32.7	S 37.7	S 42.7	S 47.8	S 52.8	S 57.8	S 62.8	S 67.8	S 72.8
	X	T 7.8	T 12.9	T 17.9	T 22.9	T 27.9	T 32.9	T 37.9	T 42.9	T 47.9	T 52.9	T 57.9	T 62.9	T 67.9	T 72.9
9	X	S 5.5	S 12.0	S 17.4	S 22.6	S 27.7	S 32.8	S 37.8	S 42.9	S 47.9	S 52.9	S 57.9	S 63.0	S 68.0	S 73.0
	X	T 8.0	T 13.1	T 18.1	T 23.1	T 28.1	T 33.1	T 38.1	T 43.1	T 48.1	T 53.1	T 58.1	T 63.1	T 68.1	T 73.1
10	X	S 5.3	S 12.1	S 17.5	S 22.7	S 27.9	S 32.9	S 38.0	S 43.0	S 48.1	S 53.1	S 58.1	S 63.1	S 68.1	S 73.1
	X	T 8.1	T 13.2	T 18.3	T 23.3	T 28.3	T 33.3	T 38.3	T 43.3	T 48.3	T 53.3	T 58.3	T 63.3	T 68.3	T 73.3
11	X	S 5.1	S 12.1	S 17.6	S 22.8	S 28.0	S 33.1	S 38.1	S 43.2	S 48.2	S 53.2	S 58.2	S 63.3	S 68.3	S 73.3
	X	T 8.2	T 13.4	T 18.4	T 23.4	T 28.4	T 33.4	T 38.4	T 43.4	T 48.4	T 53.4	T 58.4	T 63.4	T 68.4	T 73.4
12	X	S 4.9	S 12.1	S 17.7	S 22.9	S 28.1	S 33.2	S 38.2	S 43.3	S 48.3	S 53.3	S 58.4	S 63.4	S 68.4	S 73.4
	X	T 8.4	T 13.6	T 18.6	T 23.6	T 28.6	T 33.6	T 38.6	T 43.6	T 48.6	T 53.6	T 58.6	T 63.6	T 68.6	T 73.6
13	X	S 12.1	S 17.7	S 23.0	S 28.2	S 33.3	S 38.4	S 43.4	S 48.4	S 53.5	S 58.5	S 63.5	S 68.5	S 73.6	
	X	T 13.7	T 18.7	T 23.7	T 28.7	T 33.7	T 38.7	T 43.7	T 48.7	T 53.7	T 58.7	T 63.7	T 68.7	T 73.7	
14	X	S 12.1	S 17.8	S 23.1	S 28.3	S 33.4	S 38.5	S 43.5	S 48.6	S 53.6	S 58.6	S 63.6	S 68.7	S 73.7	
	X	T 13.8	T 18.9	T 23.9	T 28.9	T 33.9	T 38.9	T 43.9	T 48.9	T 53.9	T 58.9	T 63.9	T 68.9	T 73.9	
15	X	S 12.1	S 17.9	S 23.2	S 28.4	S 33.5	S 38.6	S 43.6	S 48.7	S 53.7	S 58.7	S 63.8	S 68.8	S 73.8	
	X	T 14.0	T 19.0	T 24.0	T 29.0	T 34.0	T 39.0	T 44.0	T 49.0	T 54.0	T 59.0	T 64.0	T 69.0	T 74.0	

TABLE 19
85TH PERCENTILE SPACE DISTRIBUTED (S) AND TIME DISTRIBUTED (T) VELOCITIES
AS A FUNCTION OF MEAN AND VARIANCE OF TIME DISTRIBUTED VELOCITIES
(ASSUMING TYPE III DISTRIBUTIONS)

λ	MEAN	S	5	10	15	20	25	30	35	40	45	50	55	60	65	70
VARIANCE																
20	x	> 12.0	s 13.1	s 23.5	s 28.8	s 33.9	s 39.0	s 44.1	s 49.2	s 54.2	s 59.3	s 64.3	s 69.3	s 74.3		
x	x	1 14.5	1 10.6	1 24.6	1 20.5	1 34.6	1 39.6	1 44.6	1 49.6	1 54.6	1 59.6	1 64.6	1 69.6	1 74.6		
x	x	> 11.8	s 16.2	s 23.7	s 29.1	s 34.3	s 39.4	s 44.5	s 49.6	s 54.7	s 59.7	s 64.8	s 69.8	s 74.8		
25	x	x	f 15.0	f 20.1	f 25.2	f 30.2	f 35.2	f 40.2	f 45.2	f 50.2	f 55.2	f 60.2	f 65.2	f 70.2	f 75.2	
x	x	> 11.5	s 16.2	s 23.9	s 29.3	s 34.6	s 39.8	s 44.9	s 50.0	s 55.1	s 60.1	s 65.2	s 70.2	s 75.2		
30	x	x	1 15.5	1 20.6	1 25.6	1 30.7	1 35.7	1 40.7	1 45.7	1 50.7	1 55.7	f 60.7	f 65.7	f 70.7	f 75.7	
x	x	> 11.1	s 16.2	s 24.1	s 29.5	s 34.8	s 40.0	s 45.2	s 50.3	s 55.4	s 60.5	s 65.5	s 70.6	s 75.6		
35	x	x	f 15.9	f 21.0	f 26.1	f 31.1	f 36.1	f 41.1	f 46.1	f 51.1	f 56.1	f 61.1	f 66.1	f 71.1	f 76.1	
x	x	> 10.6	s 16.1	s 24.2	s 29.7	s 35.1	s 40.3	s 45.5	s 50.6	s 55.7	s 60.8	s 65.9	s 70.9	s 76.0		
40	x	x	f 16.2	f 21.4	f 26.5	f 31.5	f 36.5	f 41.6	f 46.6	f 51.6	f 56.6	f 61.6	f 66.6	f 71.6	f 76.6	
x	x	> 10.1	s 18.0	s 24.2	s 29.9	s 35.3	s 40.5	s 45.7	s 50.9	s 56.0	s 61.1	s 66.2	s 71.2	s 76.3		
45	x	x	f 16.6	f 21.3	f 26.9	f 31.3	f 36.9	f 41.9	f 47.0	f 52.0	f 57.0	f 62.0	f 67.0	f 72.0	f 77.0	
x	x	> 9.3	s 17.9	s 24.3	s 30.6	s 35.4	s 40.7	s 45.0	s 51.1	s 56.3	s 61.4	s 66.5	s 71.5	s 76.6		
50	x	x	f 16.7	f 22.1	f 27.2	f 32.3	f 37.3	f 42.3	f 47.3	f 52.3	f 57.3	f 62.3	f 67.3	f 72.3	f 77.3	
x	x	> 11.8	s 24.3	s 30.1	s 35.6	s 40.9	s 46.2	s 51.4	s 56.5	s 61.6	s 66.7	s 71.8	s 76.9			
55	x	x	f 22.2	f 27.6	f 32.6	f 37.7	f 42.7	f 47.7	f 52.7	f 57.7	f 62.7	f 67.7	f 72.7	f 77.7		
x	x	> 11.6	s 24.2	s 30.2	s 35.7	s 41.1	s 46.4	s 51.6	s 56.7	s 61.9	s 67.0	s 72.1	s 77.1			
60	x	x	f 22.8	f 27.0	f 33.0	f 38.0	f 43.0	f 48.0	f 53.0	f 58.0	f 63.0	f 68.0	f 73.0	f 78.0		
x	x	> 11.4	s 24.2	s 30.2	s 35.8	s 41.2	s 46.5	s 51.6	s 56.9	s 62.1	s 67.2	s 72.3	s 77.4			
65	x	x	f 23.1	f 28.1	f 33.3	f 38.3	f 43.3	f 48.3	f 53.4	f 58.4	f 63.4	f 68.4	f 73.4	f 78.4		
x	x	> 11.1	s 24.2	s 30.3	s 35.9	s 41.4	s 46.7	s 52.0	s 57.1	s 62.3	s 67.4	s 72.5	s 77.6			
70	x	x	f 23.4	f 28.4	f 33.6	f 38.6	f 43.6	f 48.7	f 53.7	f 58.7	f 63.7	f 68.7	f 73.7	f 78.7		
x	x	> 16.9	s 24.1	s 30.3	s 36.0	s 41.5	s 46.9	s 52.1	s 57.3	s 62.5	s 67.6	s 72.7	s 77.8			
75	x	x	f 23.6	f 28.8	f 33.9	f 38.9	f 43.9	f 49.0	f 54.0	f 59.0	f 64.0	f 69.0	f 74.0	f 79.0		
x	x	> 16.6	s 24.1	s 30.3	s 36.1	s 41.6	s 46.7	s 52.3	s 57.5	s 62.7	s 67.8	s 73.0	s 78.1			
80	x	x	f 23.9	f 29.1	f 34.2	f 39.2	f 44.2	f 49.2	f 54.3	f 59.3	f 64.3	f 69.3	f 74.3	f 79.3		
x	x	> 16.3	s 24.0	s 30.3	s 36.2	s 41.7	s 47.1	s 52.4	s 57.7	s 62.9	s 68.0	s 73.2	s 78.3			
85	x	x	f 24.1	f 29.3	f 34.4	f 39.5	f 44.5	f 49.5	f 54.5	f 59.5	f 64.6	f 69.6	f 74.6	f 79.6		
x	x	> 16.0	s 23.9	s 30.3	s 36.2	s 41.8	s 47.3	s 52.6	s 57.8	s 63.0	s 68.2	s 73.3	s 78.5			
90	x	x	f 24.3	f 29.6	f 34.7	f 39.7	f 44.9	f 49.9	f 54.9	f 64.8	f 69.6	f 74.8	f 79.8			

TABLE 20
**85TH PERCENTILE SPACE DISTRIBUTED (S) AND TIME DISTRIBUTED (T) VELOCITIES
 AS A FUNCTION OF MEAN AND VARIANCE OF TIME DISTRIBUTED VELOCITIES
 (ASSUMING TYPE III DISTRIBUTIONS)**

X	PLAN	X	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
VAR																							
100	X	S 15.2	T 23.6	S 30.3	T 40.3	S 42.0	T 45.3	S 47.5	T 50.3	S 52.9	T 55.3	S 58.1	T 60.3	S 63.4	T 65.4	S 68.6	T 70.4	S 73.7	T 75.4	S 78.8	T 80.4		
X	X	I 24.8	T 30.1	I 35.2	T 40.7	I 36.4	T 45.8	I 42.1	T 50.8	I 47.7	T 55.8	I 53.1	T 60.9	I 58.4	T 65.9	I 63.7	T 66.9	I 68.9	T 70.9	I 75.9	T 80.9		
X	X	S 14.4	T 23.3	S 30.2	T 40.7	S 42.1	T 45.8	S 47.7	T 50.8	S 53.1	T 55.8	S 58.1	T 60.9	S 63.7	T 65.9	S 68.9	T 66.9	S 74.0	T 70.4	S 73.7	T 75.4	S 79.2	T 80.4
X	X	I 25.2	T 30.3	I 35.7	T 40.7	I 36.4	T 45.8	I 42.1	T 50.8	I 47.7	T 55.8	I 53.1	T 60.9	I 58.4	T 65.9	I 63.7	T 66.9	I 68.9	T 70.9	I 75.9	T 80.9		
120	X	S 13.6	T 23.0	S 30.1	T 41.2	S 36.4	T 46.3	S 42.3	T 51.3	S 47.9	T 56.3	S 53.3	T 61.3	S 58.6	T 66.3	S 63.9	T 71.3	S 69.2	T 76.4	S 74.3	T 81.4	S 79.5	T 81.4
X	X	I 25.6	T 31.0	I 36.1	T 41.2	I 36.4	T 46.3	I 42.3	T 51.7	I 47.9	T 56.8	I 53.3	T 61.3	I 58.6	T 66.3	I 63.9	T 71.3	I 69.2	T 76.4	I 74.3	T 81.4	S 79.5	T 81.4
130	X	S 22.0	T 30.0	S 30.0	T 41.6	S 36.4	T 46.7	S 42.3	T 52.2	S 48.0	T 57.2	S 53.5	T 62.2	S 58.9	T 67.2	S 64.2	T 72.2	S 69.4	T 76.8	S 74.6	T 81.8	S 79.8	T 81.8
X	X	I 31.4	T 36.5	I 37.0	T 41.6	I 36.4	T 46.7	I 42.3	T 52.2	I 48.1	T 57.2	I 53.7	T 62.2	I 58.9	T 67.2	I 64.2	T 72.2	I 69.4	T 76.8	I 74.6	T 81.8	S 79.8	T 81.8
140	X	S 22.2	T 31.7	S 29.8	T 42.1	S 36.4	T 47.1	S 42.4	T 52.2	S 48.1	T 57.2	S 53.7	T 62.2	S 59.1	T 67.2	S 64.4	T 72.2	S 69.7	T 77.3	S 74.9	T 82.3	S 80.1	T 82.3
X	X	I 31.7	T 37.0	I 37.0	T 42.1	I 36.4	T 47.1	I 42.4	T 52.2	I 48.1	T 57.2	I 53.7	T 62.2	I 58.9	T 67.2	I 64.2	T 72.2	I 69.7	T 77.3	I 74.9	T 82.3	S 80.1	T 82.3
150	X	S 21.0	T 32.0	S 29.6	T 42.5	S 36.3	T 47.5	S 42.4	T 52.6	S 48.2	T 57.6	S 53.8	T 62.6	S 59.3	T 67.7	S 64.6	T 72.7	S 69.9	T 77.7	S 74.6	T 82.7	S 80.3	T 82.7
X	X	I 32.0	T 37.3	I 37.3	T 42.5	I 36.3	T 47.5	I 42.4	T 52.6	I 48.2	T 57.6	I 53.8	T 62.6	I 59.3	T 67.7	I 64.6	T 72.7	I 69.9	T 77.7	I 74.6	T 82.7	S 80.3	T 82.7
160	X	S 21.3	T 32.5	S 29.4	T 43.2	S 36.3	T 48.3	S 42.5	T 53.0	S 48.3	T 58.0	S 53.9	T 63.1	S 59.4	T 68.1	S 64.8	T 73.1	S 70.1	T 78.1	S 75.4	T 83.1	S 80.6	T 83.1
X	X	I 32.5	T 37.7	I 37.7	T 42.9	I 36.3	T 48.3	I 42.5	T 53.0	I 48.3	T 58.0	I 53.9	T 63.1	I 59.4	T 68.1	I 64.8	T 73.1	I 70.1	T 78.1	I 75.4	T 83.1	S 80.6	T 83.1
170	X	S 20.7	T 32.8	S 29.2	T 38.1	S 36.2	T 43.2	S 42.5	T 48.3	S 48.4	T 53.4	S 54.1	T 58.4	S 59.6	T 63.5	S 65.0	T 70.3	S 70.3	T 78.5	S 75.6	T 83.5	S 80.8	T 83.5
X	X	I 32.8	T 38.1	I 38.1	T 43.2	I 36.2	T 43.2	I 42.5	T 48.3	I 48.4	T 53.4	I 54.1	T 58.4	I 59.6	T 63.5	I 65.0	T 70.3	I 70.3	T 78.5	I 75.6	T 83.5	S 80.8	T 83.5
180	X	S 20.2	T 33.0	S 28.9	T 38.4	S 36.1	T 43.6	S 42.5	T 47.9	S 48.4	T 53.0	S 54.2	T 58.0	S 59.7	T 63.1	S 65.2	T 70.5	S 70.5	T 78.1	S 75.8	T 83.1	S 80.6	T 83.1
X	X	I 33.0	T 38.4	I 38.4	T 43.6	I 36.1	T 43.6	I 42.5	T 47.9	I 48.4	T 53.0	I 54.2	T 58.0	I 59.7	T 63.1	I 65.2	T 70.5	I 70.5	T 78.1	I 75.8	T 83.1	S 80.6	T 83.1
190	X	S 19.6	T 33.4	S 28.7	T 38.8	S 36.0	T 44.0	S 42.4	T 49.1	S 48.5	T 54.1	S 54.3	T 59.2	S 59.8	T 64.2	S 65.3	T 70.7	S 70.7	T 79.3	S 76.0	T 84.3	S 81.3	T 84.3
X	X	I 33.4	T 39.1	I 39.1	T 44.3	I 36.0	T 44.0	I 42.4	T 49.1	I 48.5	T 54.1	I 54.3	T 59.2	I 59.8	T 64.2	I 65.3	T 70.7	I 70.7	T 79.3	I 76.0	T 84.3	S 81.3	T 84.3
200	X	S 19.0	T 33.7	S 28.4	T 39.4	S 35.8	T 44.6	S 42.4	T 49.8	S 48.5	T 54.8	S 54.3	T 59.5	S 60.0	T 64.6	S 65.5	T 70.9	S 70.9	T 79.6	S 76.2	T 84.6	S 81.5	T 84.6
X	X	I 33.7	T 39.4	I 39.4	T 44.6	I 35.8	T 44.6	I 42.4	T 49.8	I 48.5	T 54.8	I 54.3	T 59.5	I 60.0	T 64.6	I 65.5	T 70.9	I 70.9	T 79.6	I 76.2	T 84.6	S 81.5	T 84.6
210	X	S 28.1	T 39.4	S 35.7	T 44.6	S 36.1	T 49.8	S 42.4	T 54.8	S 48.5	T 59.9	S 54.4	T 64.9	S 60.1	T 69.9	S 65.6	T 71.0	S 71.0	T 75.0	S 76.4	T 80.0	S 81.7	T 85.0
X	X	I 39.4	T 44.6	I 44.6	T 49.8	I 36.1	T 49.8	I 42.4	T 54.8	I 48.5	T 59.9	I 54.4	T 64.9	I 60.1	T 69.9	I 65.6	T 71.0	I 71.0	T 75.0	I 76.4	T 80.0	S 81.7	T 85.0
220	X	S 27.7	T 39.7	S 35.5	T 44.9	S 36.3	T 50.1	S 42.3	T 55.2	S 48.5	T 60.2	S 54.5	T 65.2	S 60.2	T 65.3	S 65.7	T 70.3	S 71.2	T 75.3	S 76.5	T 80.3	S 81.8	T 85.3
X	X	I 39.7	T 44.9	I 44.9	T 50.1	I 36.3	T 50.1	I 42.3	T 55.2	I 48.5	T 60.2	I 54.5	T 65.2	I 60.2	T 65.3	I 65.7	T 70.3	I 71.2	T 75.3	I 76.5	T 80.3	S 81.8	T 85.3
230	X	S 27.4	T 40.0	S 35.3	T 45.3	S 35.0	T 50.4	S 42.2	T 55.5	S 48.5	T 60.6	S 54.5	T 65.6	S 60.2	T 65.6	S 65.8	T 70.6	S 71.3	T 75.7	S 76.7	T 80.7	S 82.0	T 85.7
X	X	I 35.3	T 45.3	I 45.3	T 50.4	I 35.0	T 50.4	I 42.2	T 55.5	I 48.5	T 60.6	I 54.5	T 65.6	I 60.2	T 65.6	I 65.8	T 70.6	I 71.3	T 75.7	I 76.7	T 80.7	S 82.0	T 85.7
240	X	S 27.0	T 40.3	S 35.1	T 45.6	S 35.7	T 50.7	S 42.1	T 55.8	S 48.5	T 60.9	S 54.5	T 65.9	S 60.3	T 65.9	S 65.9	T 71.0	S 71.4	T 76.0	S 76.8	T 81.0	S 82.2	T 86.0
X	X	I 40.3	T 45.6	I 45.6	T 50.7	I 35.7	T 50.7	I 42.1	T 55.8	I 48.5	T 60.9	I 54.5	T 65.9	I 60.3	T 65.9	I 65.9	T 71.0	I 71.4	T 76.0	I 76.8	T 81.0	S 82.2	T 86.0

**BASIC DISTRIBUTION LIST
FOR UNCLASSIFIED TECHNICAL REPORTS**

Head, Logistics and Mathematical Statistics Branch
Office of Naval Research
Washington 25, D.C.

C. O., ONR Branch Office
Navy No. 100, Box 39, F.P.O.
New York City, New York

ASTIA Document Service Center
Arlington Hall Station
Arlington 12, Virginia

Institute for Defense Analyses
Communications Research Div.
von Neumann Hall
Princeton, New Jersey

Technical Information Officer
Naval Research Laboratory
Washington 25, D.C.

C. O., ONR Branch Office
346 Broadway, New York 13, NY
Attn: J. Laderman

C. O., ONR Branch Office
1030 East Green Street
Pasadena 1, California
Attn: Dr. A.R. Laufer

Bureau of Supplies and Accounts
Code OW, Dept. of the Navy
Washington 25, D.C.

Professor Russell Ackoff
Operations Research Group
Case Institute of Technology
Cleveland 6, Ohio

Professor Kenneth J. Arrow
Serra House, Stanford University
Stanford, California

Professor G. L. Bach
Carnegie Institute of Technology
Planning and Control of Industrial Operations, Schenley Park
Pittsburgh 13, Pennsylvania

Professor A. Charnes
The Technological Institute
Northwestern University
Evanston, Illinois

Professor L. W. Cohen
Math. Dept., University of Maryland
College Park, Maryland

Professor Donald Eckman
Director, Systems Research Center
Case Institute of Technology
Cleveland, Ohio

Professor Lawrence E. Fouraker
Department of Economics
The Pennsylvania State University
State College, Pennsylvania

Professor David Gale
Dept. of Math., Brown University
Providence 12, Rhode Island

Dr. Murray Geisler
The RAND Corporation
1700 Main Street
Santa Monica, California

Professor L. Hurwicz
School of Business Administration
University of Minnesota
Minneapolis 14, Minnesota

Professor James R. Jackson
Management Sciences Research Project, Univ. of California
Los Angeles 24, California

Professor Samuel Karlin
Math. Dept., Stanford University
Stanford, California

Professor C. E. Lemke
Dept. of Mathematics
Rensselaer Polytechnic Institute
Troy, New York

Professor W.H. Marlow
Logistics Research Project
The George Washington University
707 - 22nd Street, N.W.
Washington 7, D.C.

Professor Oskar Morgenstern
Economics Research Project
Princeton University
92 A Nassau Street
Princeton, New Jersey

BASIC DISTRIBUTION LIST
FOR UNCLASSIFIED TECHNICAL REPORTS

Professor R. Radner
Department of Economics
University of California
Berkeley, California

Professor Stanley Reiter
Department of Economics
Purdue University
Lafayette, Indiana

Professor Murray Rosenblatt
Department of Mathematics
Brown University
Providence 12, Rhode Island

Mr. J. R. Simpson
Bureau of Supplies and Accounts
Navy Department (Code W31)
Washington 25, D. C.

Professor A. W. Tucker
Department of Mathematics
Princeton University
Princeton, New Jersey

Professor J. Wolfowitz
Department of Mathematics
Lincoln Hall, Cornell University
Ithaca 1, New York